



[4910-13]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. FAA-2013-1001; Notice No. 25-13-35-SC]

Special Conditions: Airbus, A350-900 Series Airplane; High Speed Protection System

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed special conditions.

SUMMARY: This action proposes special conditions for Airbus A350-900 series airplanes.

These airplanes will have a novel or unusual design feature when compared to the state of technology envisioned in the airworthiness standards for transport category airplanes. These design features include a high-speed protection system. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These proposed special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

DATES: We must receive your comments by **[INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: Send comments identified by docket number FAA-2013-1001 using any of the following methods:

- Federal eRegulations Portal: Go to <http://www.regulations.gov/> and follow the online instructions for sending your comments electronically.
- Mail: Send comments to Docket Operations, M-30, U.S. Department of Transportation (DOT), 1200 New Jersey Avenue, SE, Room W12-140, West Building Ground Floor, Washington, D.C., 20590-0001.
- Hand Delivery or Courier: Take comments to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE, Washington, D.C., between 8 a.m. and 5 p.m., Monday through Friday, except federal holidays.
- Fax: Fax comments to Docket Operations at 202-493-2251.

Privacy: The FAA will post all comments it receives, without change, to <http://www.regulations.gov/>, including any personal information the commenter provides. Using the search function of the docket web site, anyone can find and read the electronic form of all comments received into any FAA docket, including the name of the individual sending the comment (or signing the comment for an association, business, labor union, etc.). DOT's complete Privacy Act Statement can be found in the Federal Register published on April 11, 2000 (65 FR 19477-19478), as well as at <http://DocketsInfo.dot.gov/>.

Docket: Background documents or comments received may be read at <http://www.regulations.gov/> at any time. Follow the online instructions for accessing the docket or go to the Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE, Washington, D.C., between 9 a.m. and 5 p.m., Monday through Friday, except federal holidays.

FOR FURTHER INFORMATION CONTACT: Todd Martin, FAA, Airframe/Cabin Safety, ANM-115, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue

SW., Renton, Washington, 98057-3356; telephone (425) 227-1178; facsimile (425) 227-1322.

SUPPLEMENTARY INFORMATION:

Comments Invited

We invite interested people to take part in this rulemaking by sending written comments, data, or views. The most helpful comments reference a specific portion of the special conditions, explain the reason for any recommended change, and include supporting data. We ask that you send us two copies of written comments.

We will file in the docket all comments we receive, as well as a report summarizing each substantive public contact with FAA personnel concerning these special conditions. You can inspect the docket before and after the comment closing date. If you wish to review the docket in person, go to the address in the ADDRESSES section of this preamble between 7:30 a.m. and 4:00 p.m., Monday through Friday, except Federal holidays.

We will consider all comments we receive on or before the closing date for comments. We will consider comments filed late if it is possible to do so without incurring expense or delay. We may change these special conditions based on the comments we receive.

If you want us to acknowledge receipt of your comments on this proposal, include with your comments a self-addressed, stamped postcard on which you have written the docket number. We will stamp the date on the postcard and mail it back to you.

Background

On August 25, 2008, Airbus applied for a type certificate for their new A350-900 series airplane. Later, Airbus requested and the FAA approved an extension to the application for FAA type certification to June 28, 2009. The A350-900 series has a conventional layout with twin wing-mounted Rolls Royce Trent engines. It features a twin aisle 9-abreast economy class

layout, and accommodates side-by-side placement of LD-3 containers in the cargo compartment. The basic A350-900 series configuration accommodates 315 passengers in a standard two-class arrangement. The design cruise speed is Mach 0.89 with a Maximum Take-Off Weight of 591,000 lbs. Airbus proposes the A350-900 series to be certified for extended operations (ETOPS) beyond 180 minutes at entry into service for up to a 420 minute maximum diversion time.

The A350-900, like Airbus A320, A330, A340 and A380 series aircraft, has a high speed protection system that limits nose down pilot authority at speeds above V_C/M_C , and prevents the airplane from actually performing the maneuver required under § 25.335(b)(1). Special conditions are necessary to address the Airbus A350-900 series high speed protection system. The proposed special conditions identify various symmetric and non-symmetric maneuvers that will ensure that an appropriate design dive speed, V_D/M_D , is established.

Type Certification Basis

Under Title 14, Code of Federal Regulations (14 CFR) 21.17, Airbus must show that the A350-900 series meets the applicable provisions of part 25, as amended by Amendments 25-1 through 25-129.

If the Administrator finds that the applicable airworthiness regulations (i.e., 14 CFR part 25) do not contain adequate or appropriate safety standards for the A350-900 series because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same or similar novel or unusual design feature, the special conditions would also apply to

the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the A350-900 series must comply with the fuel vent and exhaust emission requirements of 14 CFR part 34 and the noise certification requirements of 14 CFR part 36 and the FAA must issue a finding of regulatory adequacy under section 611 of Public Law 92-574, the "Noise Control Act of 1972."

The FAA issues special conditions, as defined in 14 CFR 11.19, under § 11.38, and they become part of the type-certification basis under § 21.17(a)(2).

Novel or Unusual Design Features

The Airbus A350-900 series will incorporate the following novel or unusual design features:

A high speed protection system that limits nose down pilot authority at speeds above V_C/M_C , and prevents the airplane from actually performing the maneuver required under § 25.335(b)(1). The proposed special conditions identify various symmetric and non-symmetric maneuvers that will ensure that an appropriate design dive speed, V_D/M_D , is established.

Discussion

Section 25.335(b)(1) is an analytical envelope condition which was originally adopted in Part 4b of the Civil Air Regulations in order to provide an acceptable speed margin between design cruise speed and design dive speed. Flutter clearance design speeds and airframe design loads are impacted by the design dive speed. While the initial condition for the upset specified in the rule is 1g level flight, protection is afforded for other inadvertent overspeed conditions as well. Section 25.335(b)(1) is intended as a conservative enveloping condition for potential overspeed conditions, including non-symmetric ones.

To establish that potential overspeed conditions are enveloped, the applicant should

demonstrate that any reduced speed margin, based on the high speed protection system in the A350-900 series, will not be exceeded in inadvertent, or gust induced, upsets resulting in initiation of the dive from non-symmetric attitudes; or that the airplane is protected by the flight control laws from getting into non-symmetric upset conditions. The proposed special conditions identify various symmetric and non-symmetric maneuvers that will ensure that an appropriate design dive speed, V_D/M_D , is established.

These special conditions are proposed in lieu of § 25.335(b)(1). Section 25.335(b)(2), which also addresses the design dive speed, is applied separately (Advisory Circular (AC) 25.335-1A provides an acceptable means of compliance to § 25.335(b)(2)). The applicant should conduct a demonstration that includes a comprehensive set of conditions, as described below.

Paragraph (2) of the proposed special condition references AC 25-7C, section 32.c.(3), included here for information.

“(3) Gust Upset. In the following three upset tests, the values of displacement should be appropriate to the airplane type and should depend upon airplane stability and inertia characteristics. The lower and upper limits should be used for airplanes with low and high maneuverability, respectively.

(a) With the airplane trimmed in wings-level flight, simulate a transient gust by rapidly rolling to the maximum bank angle appropriate for the airplane, but not less than 45 degrees nor more than 60 degrees. The rudder and longitudinal control should be held fixed during the time that the required bank is being attained. The rolling velocity should be arrested at this bank angle. Following this, the controls should be abandoned for a minimum of 3 seconds after V_{MO}/M_{MO} or 10 seconds, whichever occurs first.

(b) Perform a longitudinal upset from normal cruise. Airplane trim is determined at

V_{MO}/M_{MO} using power/thrust required for level flight but with not more than maximum continuous power/thrust. (If V_{MO}/M_{MO} cannot be reached in level flight with maximum continuous power or thrust, then the airplane should be trimmed at V_{MO}/M_{MO} in a descent.) This is followed by a decrease in speed, after which a pitch attitude of 6-12 degrees nose down, as appropriate for the airplane type, is attained using the same power/thrust and trim. The airplane is permitted to accelerate until 3 seconds after V_{MO}/M_{MO} . The force limits of § 25.143(d) for short term application apply.

(c) Perform a two-axis upset, consisting of combined longitudinal and lateral upsets. Perform the longitudinal upset, as in paragraph (b) above, and when the pitch attitude is set, but before reaching V_{MO}/M_{MO} , roll the airplane 15-25 degrees. The established attitude should be maintained until 3 seconds after V_{MO}/M_{MO} .”

Paragraphs (3) and (4) of the proposed special condition indicate that failures of the high speed protection system must be improbable and must be annunciated to the pilots. If these two criteria are not met, then the probability that the established dive speed will be exceeded, and the resulting risk to the airplane, is too great. On the other hand, if the high speed protection system is known to be inoperative, then dispatch of the airplane could be acceptable under an approved Minimum Equipment List (MEL) containing language similar to paragraph (5). Dispatch under an MEL would require that appropriate reduced operating speeds, V_{MO}/M_{MO} , are provided in the airplane flight manual, and the cockpit display of those reduced speeds, as well as the overspeed warning for exceeding those speeds, are equivalent to that of the normal airplane with the high speed protection system operative.

We do not believe that application of the Interaction of Systems and Structures special condition (reference A350 issue paper A-3) or the European Aviation Safety Agency (EASA)

Certification Specification (CS) 25.302, is appropriate in this case, because design dive speed is, in and of itself, part of the design criteria. Stability and control, flight loads, and flutter evaluations all depend on the design dive speed. Therefore, a single design dive speed should be established that will not be exceeded taking into account the performance of the high speed protection system, as well as its failure modes, failure indications and accompanying flight manual instructions.

Applicability

As discussed above, these special conditions apply to A350-900 series airplanes. Should Airbus apply at a later date for a change to the type certificate to include another series incorporating the same novel or unusual design feature, the special conditions would apply to that series as well.

Conclusion

This action affects only certain novel or unusual design features on the Airbus A350-900 series airplanes. It is not a rule of general applicability.

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

The Proposed Special Conditions

Accordingly, the Federal Aviation Administration (FAA) proposes the following special conditions as part of the type certification basis for Airbus A350-900 series airplanes.

(1) In lieu of compliance with § 25.335(b)(1), if the flight control system includes functions that act automatically to initiate recovery before the end of the 20 second period

specified in § 25.335(b)(1), V_D/M_D must be determined from the greater of the speeds resulting from conditions (a) and (b) below. The speed increase occurring in these maneuvers may be calculated, if reliable or conservative aerodynamic data are used.

(a) From an initial condition of stabilized flight at V_C/M_C , the airplane is upset so as to take up a new flight path 7.5 degrees below the initial path. Control application, up to full authority, is made to try and maintain this new flight path. Twenty seconds after initiating the upset, manual recovery is made at a load factor of 1.5 g (0.5 acceleration increment), or such greater load factor that is automatically applied by the system with the pilot's pitch control set to neutral. Power, as specified in § 25.175(b)(1)(iv), is assumed until recovery is initiated, at which time power reduction and the use of pilot controlled drag devices may be used.

(b) From a speed below V_C/M_C , with power to maintain stabilized level flight at this speed, the airplane is upset so as to accelerate through V_C/M_C at a flight path 15 degrees below the initial path (or at the steepest nose down attitude that the system will permit with full control authority if less than 15 degrees). The pilot's controls may be in the neutral position after reaching V_C/M_C and before recovery is initiated. Recovery may be initiated three seconds after operation of the high speed warning system by application of a load of 1.5g (0.5 acceleration increment), or such greater load factor that is automatically applied by the system with the pilot's pitch control neutral. Power may be reduced simultaneously. All other means of decelerating the airplane, the use of which is authorized up to the highest speed reached in the maneuver, may be used. The interval between successive pilot actions must not be less than one second.

(2) The applicant must also demonstrate that the speed margin, established as above, will not be exceeded in inadvertent, or gust induced, upsets resulting in initiation of the dive from non-symmetric attitudes, unless the airplane is protected by the flight control laws from getting

into non-symmetric upset conditions. The upset maneuvers described in AC 25-7C, Chapter 2, Section 8, Paragraph 32c.(3)(a) and (c), may be used to comply with this requirement.

(3) Detected loss of the high speed protection function must be less than 10^{-3} per flight hour.

(4) Failures of the system must be annunciated to the pilots. The Operating Limitations Section of the Airplane Flight Manual must contain instructions that reduce the maximum operating speeds, V_{\max}/M_{\max} , to a value that maintains a speed margin between these speeds and V_D/M_D that is consistent with showing compliance to § 25.335(b) without the benefit of the high speed protection system.

(5) Dispatch of the airplane with the high speed protection system inoperative is prohibited except under an approved Minimum Equipment List (MEL) that requires Airplane Flight Manual instructions to indicate reduced maximum operating speeds, as described in paragraph (4). In addition, the cockpit display of the reduced operating speeds, as well as the overspeed warning for exceeding those speeds, must be equivalent to that of the normal airplane with the high speed protection system operative. Also, it must be shown that no additional hazards are introduced with the high speed protection system inoperative.

Issued in Renton, Washington, on November 16, 2013.

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